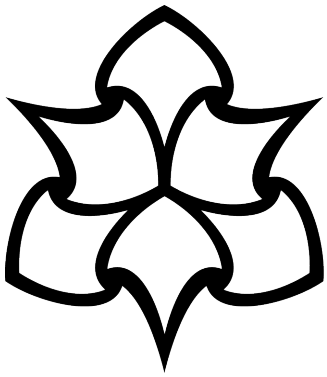

Indirect request processing, sentence-types and illocutionary forces

Abstract

Nicolas Ruytenbeek [a,b,*,] Ekaterina Ostashchenko [a], Mikhail Kissine [a]
[a] Université libre de Bruxelles, Centre de recherche en Linguistique (LaDisco), CP175, 50 avenue F. D. Roosevelt, 1050 Bruxelles, Belgium [b] Fonds National de la Recherche Scientifique (F.R.S.-FNRS), Belgium

1 Introduction

According to what can be called the 'literalist' conception of speech acts, the semantics of (major) morpho-syntactic sentences types — e.g. imperative, declarative and interrogative — determines major illocutionary force types — e.g. directive, assertive and question (e.g. Sadock & Zwicky, 1985). This conception is at the core of traditional Speech Act Theory (Searle, 1969, 1975b; Vanderveken, 1990) and threads, under one guise or another, several contemporary theories of sentential mood (see Kissine, 2012, 2013; Recanati, 2013 for detailed discussions). For instance, authors like Han (2000), Barker (2004), Boisvert & Ludwig (2006) or Isac (2015) all posit that the interpretation of the imperative sentence (1) as a request, viz. its directive illocutionary force, is determined by the meaning of the imperative mood (for a detailed overview, see Jary & Kissine, 2014).

(1) Close the door.

Literalist theories bind directive force with the imperative mood, but they do, of course, acknowledge that directive speech acts may performed with a non-imperative sentence, as in (2)-(4).

(2) Can you close the door?
(3) Is it possible to close the door?
(4) It's cold in here.

The simplest analysis is that such requests are indirect, in that they are performed by means of, and in addition to the direct speech act encoded by the sentence-type (Searle, 1975a). It is plausible that the directive force of (4) inferentially follows from on its being understood as assertion that it is cold. However, interpreting (2) as a request is probably not mediated by its being understood as a question about the addressee's ability to open the door. For this reason, since the early days of Speech Act Theory, constructions such as (2) were treated as conventionalised ways to perform requests (Bach, 1998; Morgan, 1978; Searle, 1975a).

To insist, according to the literalist view the direct illocutionary force of an utterance is determined by the semantics its sentence type. Consequently, conventionalisation of indirect request should result in the construction at hand acquiring the directive illocutionary force as part of (one of) its encoded meaning(s). This position has been explicitly argued for by Sadock (1974) and more recently by Stefanowitsch (2003). Another consequence of

literalism, then, is that any request that is non-imperative and non-conventionalised entails the derivation of a primary illocutionary force, determined by the utterance sentence-type. For instance, the directive interpretation of the conventionalised of (2) should be as direct as that of (1). But crucially, any directive interpretation of the non-conventionalised (3), by contrast, should necessarily be mediated by the derivation of the force of assertion.[1] That is, even though under their interrogative interpretation (2) and (3) are semantically very similar, since the latter is not a conventionalised indirect request, its directive interpretation should necessarily involve the derivation of the interrogative meaning.

An alternative to literalism consists in defining the encoded meaning of sentence-types without invoking illocutionary force, but using semantic features that would predict the kind of speech act these sentences are prototypically used to perform (Kissine, 2012, 2013; Recanati, 2013). Restricting the discussion to the semantics of imperative sentences, one such feature that has been often invoked (under one form or another) to explain their association with directive force is potentiality, viz. the fact that the content is neither ruled in nor ruled out by the common ground (Davies, 1986; Jary & Kissine, 2016, forthcoming; Kaufmann, 2012, pp. 155-157; Kissine, 2013; Wilson & Sperber, 1988). Another important feature is that imperative sentences are inherently addressee-oriented, thus not resulting in a predication of a property of a subject (Mastop, 2005; Zanuttini, 2008; Zanuttini, Pak, & Portner, 2012).

Of course, the way these semantic features are implemented, as well as how they are said to conspire with the context in order to give rise to a directive reading vary greatly author from author. For instance, Kaufmann (2012) assigns a declarative semantics to the imperative mood, analysing it as necessity modal, whose use in directive speech acts is explained through presupposition mechanisms that result in an unchallengeable update of the common ground. In a wholly different framework, Ruytenbeek (2017, chap. 1-2) models both imperative sentences and directive speech acts in terms of force dynamics (in the sense of Talmy, 2000). In his view, the former correspond to a pattern where only the addressee is represented as an agonist of a force interaction, whereas the latter include the speaker as the antagonist exerting a force on the addressee, the outcome of this force interaction outcome left undetermined.

Our aim here is obviously not to review and compare different accounts of imperative mood (see, for instance, Jary & Kissine, 2014). Rather, we are interested in the different predictions non-literalist theories entail relative to the processing of non-imperative requests. Since they do not directly include illocutionary forces within sentence-type semantics, accounts of this kind are open to the possibility that non-imperative sentences may, on certain

[1] Unless, of course, that constructions as (4) are also conventionalised indirect request. Below we provide evidence that this, arguably very counter-intuitive position, lacks empirical support.

occasions, receive directive force without any other force being activated. More precisely, unlike in literalist theories, a non-imperative sentence may receive only the directive illocutionary force without the directive interpretation being attached to this sentence by a process of conventionalisation. That is, even though the interrogative in (3) is not a construction that can to be conventionally associated with directive force, it may nevertheless be interpreted without also being interpreted as a question, just like the conventionalised (2). This is all the more so, as both (2) and (3) are related to the directive force the same 'convention of means' (REFS): both explicitly evoke the addressee's ability to carry out the requested action (REFS). **DVP EN UNE PHRASE.**

To put it in a slightly different way, in a non-literalist theory of illocutionary force processing, a request can be *indirect*, in the sense of not being prototypically associated with directive force, without necessarily being *secondary*, i.e., without being associated with the activation of a non-directive illocutionary force (Kissine, 2013, pp. 111-122; Recanati, 1987, pp. 165-167). By contrast, in literalist theories any non-conventional indirect request is necessarily secondary. At this stage, then, it becomes clear that these two families of theories make diametrically opposite predictions as to the processing of indirect requests. For a non-literalist, an interrogative sentence, such as (3), may be interpreted as a request without the force of questioning be activated. By contrast, literalist theories ought to predict that whenever a non-conventionalised interrogative, such as (3), is interpreted as request, the interpretation as a question is also activated.

Non-literalist theories entail another clear empirical prediction. Since the association between the imperative sentence-type and directive speech acts is explained by the semantic (non-illocutionary) features of the former, it follows that any other sentence with a similar semantics should be as readily and directly assigned directive force as imperatives. As just mentioned, Ruytenbeek (2017) analyses imperatives as expressing a force exertion on the addressee. Interestingly, in cognitive linguistic frameworks, exactly the same analysis could be applied to the deontic modals such as (5) (e.g., Sweetser, 1990, pp. 52-54).

(5) You must close the window.

Under such a force-dynamic analysis, it makes sense to assume that — just as is the case with imperatives — when *You must VP* is used as a directive, the force exertion pattern is specified with the speaker as the source of the force exerted on the addressee. (**RAJ UNE FIGURE**) Accordingly, directives performed with *You must VP* forms should be as direct as the imperative ones. The same prediction follows from Kaufmann's (2012) semantics of imperatives as a necessity modal. She explicitely assumes that imperatives have exactly the same semantics as deontic modals in cases like (5), predicting that their favoured interpretation is a directive one (a claim initially made by Ninan, 2005).

The mechanism underlying the processing of indirect — or rather, non-imperative — requests is thus a clear empirical test for the validity of non-literalist conceptions of the interface between the pragmatics of illocutionary forces and the semantics of sentence types. To repeat, these theories predict, first, that even in non-conventionalised indirect requests the directive force may be primary, and, second, that deontic modals are as closely associated with directive force as imperatives.

To the best of our knowledge, these two predictions have never been tested within the existing experimental literature on indirect speech acts (see Ruytenbeek, in press; Terkourafi, 2009 for a detailed overview). Empirical research carried out in the late seventies show that people sometimes answers *yes* to conventionalised indirect requests for information, such as (6), which does suggest that the interrogative meaning is processed at some level (Munro 1979, Clark 1979, see also Abbeduto et al. 1989).

(6) Could you tell me the time?

However, it is unclear whether in such cases, the request for information is genuinely secondary or whether answering *yes* results from the activation of a formulaic question-answer pair (in the sense of Conversational analysis (Schegloff **REF**). Furthermore, studies carried out by Gibbs (1979; 1983) provided evidence that understanding expressions such as (7)-(8) as indirect requests does not take longer than understanding the same expressions as direct questions. In a context that primes directive interpretation, the direct question uses of these expressions even took longer than their indirect uses.

(7) Must you close the window? (meaning “Do not close the window”)
(8) Can’t you be friendly? (meaning “Please be friendly to other people”)

It thus plausible that conventional indirect requests may be understood as fast as the direct “question” use of the same expression, which has led researchers to conclude that they do not entail extra processing costs relative to their direct counterparts (see also Shapiro and Murphy (1993). Note, however, that to genuinely draw this conclusion indirect requests should be compared to imperatives. More importantly, nothing is known yet as to the directive processing of non-conventionalised interrogatives, such as (3) and of directive interpretation of deontic modals, such as in (5). In what follows, we report two experiments, addressing these questions.

2 Study 1: Conventionalised vs. non-conventionalised indirect requests

The aim of our first study is to determine whether a non-conventionalised indirect request can be both indirect and primary. If this is the case, the directive interpretation of both conventionalised and non-conventionalised indirect request should not differ from that of imperative requests. Importantly, imperative and indirect requests should be compared in a context that allows both direct and indirect interpretations of the latter, in order to make sure

that what is measured are the processing correlates of the choice of an indirect illocutionary force and not that of a directive interpretation forced by the context.[2]

2.1 Materials

The studies reported in this paper are carried out in French, and the French equivalents of (2)-(3) appear to be perfect candidates of conventionalised and non-conventionalised indirect requests:

(9) Pouvez-vous VP?

Can you VP

(10) Est-il possible de VP ?
Is=it possible to VP

Their literal meaning is very close, and in a context where the only plausible interpretation of *pouvez* and *possible* is that of an ability modal, almost equivalent.

However, the only measures of conventionalisation of speech acts available in the literature are certain surface properties. For instance, Sadock (1974) and Stefanowitsch (2003) argue that the felicity of *please* or of the vocative *someone* in *Could you VP ?* constructions reveals that they are conventionally associated with the directive force, in exactly the same way as imperative sentences.

(11) Could you please close the door?
(12) Could you close the door, someone?

Unfortunately, such formal criteria are not entirely reliable. On the one hand, some uses of the imperative clearly disallow *please* and *someone* (Jary & Kissine, 2014, p. 18).

(13) Be glad that we are leaving, (# please /# someone).

On the other hand, *please* and *someone* are perfectly acceptable in certain non-imperative sentence that clearly cannot be classified as conventionalised indirect requests (Davies, 1986, p. 21):

(14) I'd appreciate if you would please be quite.
(15) The phone is ringing, someone.
(16) Where are my slippers, someone.

Instead of relying on surface properties, we used a corpus exploration to ensure that *Can you VP?* and *Is it possible VP?* in French differ as to their degree of conventionalisation as indirect requests. All sentences that contained either the variants of *Can you* (*n*=751) or the variants of *Is it possible* (*n*=89) were selected from the texts dated after 1900 on the French written corpus Frantext (see references):

[2] In that respect, our study differs from the methodology used by Gibss (REF) who…

Variants of *Can you* constructions: (<u>FAIRE UN TABLEAU AVEC CA</u>)

Pouvez-vous	Peux-tu	Pourriez-vous
can-IND.PR.2SG/PL=*you*	*can*-IND.PR.2SG=*you*	*can*-COND.PR.2PL=*you*
Pourrais-tu		
can-COND.PR.2SG=*you*		

Variants of *Is it possible* construction:

Est-il possible de	Serait-il possible de
is-IND.PR.3SG=*it possible to*	*is*-COND.PR.3SG=*it possible to*
Est-il possible que tu/vous	Serait-il possible que tu/vous
is-IND.PR.3SG=*it possible that you*-SG/PL	*is*-COND.PR.3SG=*it possible that you*-SG/PL

Each token was analysed in its context and coded as (a) an indirect request, (b) a genuine question or (c) a rhetorical question. For *Can you* forms directive uses were the most frequent (68.4%), followed by direct questions (26%) and rhetorical questions (5.6%), while for *Is it possible* forms the direct questions represented the most frequent use (63%), followed by rhetorical questions (22.5%) and directive uses (14.5%). The difference of distribution between the two types of forms was statistically significant ($\chi^2(2) = 103.84$, $p<.0001$). The results of this corpus search clearly indicate that *Can you* forms in French are prototypically associated with requests, while *Is it possible to* ones are mostly used in questions.

As already mentioned, in order to compare the processing of directive requests of these two forms, it is crucial to design a task that does not a priori bias the interpretation towards the directive reading. Our task consisted in 24 combinations of an audio presentation of a sentence with a video display of a grid containing coloured shapes and, beneath it, two buttons, *Yes* and *No*. The sentences were of the four following types: [3] 6 control imperatives, such as (17), 6 control interrogatives, such as (18), 6 *Can you VP?* interrogatives, such as (19), and 6 *Is it possible to VP?* interrogatives, such as (20).

(17) Mettez le cercle rouge à gauche du rectangle jaune.
'Move the red circle to the left of the yellow rectangle.'

(18) Le cercle rouge est-il à gauche du rectangle bleu ?
'Is the red circle on the left of the blue rectangle?'

(19) Pouvez-vous mettre le cercle rouge à gauche du rectangle jaune ?
'Can you move the red circle to the left of the yellow rectangle?'

[3] The sentences were spoken by two female native speakers of French and recorded using Praat (version 6021). We thank Amandine Colson and Philippine Geelhand de Merxem for their vocal recordings (Experiments 1-2).

(20) Est-il possible de mettre le cercle rouge à gauche du rectangle jaune ?

'Is it possible to move the red circle to the left of the yellow rectangle?'

Control imperatives could be responded to only by moving a shape in the instructed position in the grid, while control interrogatives could be responded to only by answering *yes* and *no*. For all the grids, the two objects referred to by the sentences could only be singled out if both their shape and their color were taken into account. Moving a colored shape was "possible" if the position in the grid, which was referred to by the sentence, was empty so that the object could be moved to that position; it was "impossible" otherwise (this rule was implicit to the task). For the imperative sentences, it was always possible to move the shape as indicated in the sentence. For all the interrogative sentences, there was an equal number of trials where the movement was possible (and the correct answer to the corresponding question was *yes*) and those where it was not (and the correct answer to the corresponding question was *no*). Therefore, it was possible to respond to the sentence by moving the shape only for half of the target *Can you* and *Is it possible* stimuli. In this way, we ensured that the directive interpretation of these sentences did not reflect the fact that no other reading was contextually possible.

Insert Figure 1 about here

Figure 1 Example of a screen associated with a sentence.

The presentation of each sentence was associated with a grid consisting in a different arrangement of 8 geometrical shapes (2 triangles, 2 circles, 2 squares, and 2 rectangles) of 4 possible colors (yellow, red, green, and blue). Each trial consisted in the combination of a spoken sentence and a grid. 5 lists were created, in which the order of the 24 trials was randomized; the participants were randomly assigned to a list.

A short training consisted in 4 combinations of a spoken sentence and a grid, involving 2 explicit performatives such as (21), and interrogatives such as (22). For the explicit performative sentences, it was possible to move the shape as indicated in the sentence. For one interrogative, the correct answer was *yes*; for the other one, the correct answer was *no*.

(21) Nous vous demandons de mettre le cercle rouge à gauche du rectangle jaune.

'We are asking you to move the red circle to the left of the yellow rectangle.'

(22) Y a-t-il un cercle rouge dans cette grille ?

'Is there a red circle in this grid?'

2.2 Participants and procedure [4]

41 students at the Université libre de Bruxelles, native French speakers, participated in the experiment in exchange for a payment of 8 € (29 female, mean age = 21.7 years, standard deviation = 2.83 years, range = 17–29 years). 6 of them were left-handed, but all of them were used to handle the computer mouse with their right hand and they did so during the experiment. All the participants had normal hearing, normal or corrected-to-normal vision and none of them had language disorders. None of them had graduated in linguistics or had previous experience with the experimental design. A signed informed consent was obtained for each participant.

The participants were seated in a small office, in front of an ASUS laptop computer (screen resolution 1920 x 1080). To present the stimuli, a script was created using Adobe Flash with ActionScript 2.0. This script allowed the participants to move the object inside the grid or click the *yes/no* button. It was run in Tobii Studio software (version 3.4.6) as the screen recording media element. Five different versions of the script were created, corresponding to the five lists of participants. The sentences were presented through Sennheiser MM 550–X circumaural headphones. Before the onset of the experiment, each participant underwent a calibration procedure. The participants' eye movements and fixations were measured with a Tobii Studio eye-tracker X2–60 (sampling at 60Hz). Mouse clicks and eye movements were recorded by Tobii Studio.

Each trial was initiated by clicking a black circular button in the centre of a blank screen. Clicking the button immediately launched the audio file containing a recorded spoken sentence. The task for the participants was to listen to each sentence and to respond to it either by answering with *yes/no* or by displacing a shape within the grid. To answer with *yes* or *no*, they clicked the *yes/no* buttons at the bottom of the screen. Only one response per item was allowed. The participants moved automatically to the next trial after clicking the *yes/no* buttons or after they had dropped a shape in a box of the grid. In all the trials, the grid was located in the upper part of the screen, and the *yes/no* buttons at the bottom, with *yes* on the left and *no* on the right. The position of the *yes* and *no* buttons were not counterbalanced.

Before the onset of the experiment, the participants were presented with the instructions on the screen of the computer. First, they were told that the experiment would consist in a situation test in which they would interact with a grid and *yes/no* buttons, and that the grid would contain colored geometrical shapes. Next, they were informed that they would hear sentences displayed in the headphones and that, for each spoken sentence, a grid would be displayed on the screen, with the *yes/no* buttons at the bottom of the screen. They were told to use the buttons to answer with *yes* or *no* and, to comply with an instruction, to move the shape as indicated by the sentence. They were also told that, for each sentence they

[4] The full instructions for this and the next study, as well as the audio files containing the recorded utterances, are available on the Open Science Framework (https://osf.io/s9mq8/).

would hear, only one response would be allowed (either a *yes/no* answer or moving a shape). They were also asked to avoid making mistakes while trying to respond as fast as possible.

2.3 Results

All the reported analyses were carried out with the R software version 3.2.2 for Windows (R development core team, 2015). The data for this experiment are available on the Open Science Framework (https://osf.io/s9mq8/). All mixed regression models were fitted using the lme4 package (Bates and Sarkar 2007). The significance of a factor was tested by comparing a model with this factor to a null model that excluded it but had an otherwise identical random factor structure. All pairwise post-hoc comparisons were carried out using the lsmeans function with Tukey adjustment for multiple comparisons from the lsmeans package (Lenth 2016).

First, we assessed whether conventionalised *Can you move_?* interrogative sentences gave rise to more directive interpretations than the non-conventionalised *Is it possible to move _?*. Responses to the spoken sentences were classified into answers (*yes* or *no*) and moves (moving a shape in the grid). Evidence that an interrogative sentence is interpreted as a question (request for information) would be a *yes* answer to the question expressed. Evidence for a directive, "request for action" interpretation of an interrogative would be that, upon hearing the sentence, the participant moves the shape as indicated by the sentence instead of answering *yes* to the question. We restricted the analysis to those stimuli for which the correct response was *yes*, and hence, for which it was possible to respond by moving the shape mentioned in the sentence. A binomial mixed model, with participant intercept as random factor revealed that the number of directive interpretations was higher for conventionalised *Can you move_?* than for non-conventionalised *Is it possible to move _?* interrogative sentences (β= 0.79; *z*= 2.031; p =0.043; see about her

Figure 2).

Insert Figure 2 about her

Figure 2 : Responses per sentence type. Only those *You can* and *It is possible* sentences for which the move response is possible are included. Vertical bars represent standard error.

Second, we compared response times to different sentences, defined as the length of time comprised between the moment when the first colored shape was spoken out in the sentence (computed with Audacity 2.0.6 and coded in Tobii Studio) and the mouse click on the *yes/no* buttons (for *yes/no* answers) or the first mouse click on a shape in the grid (for "move in the grid" responses). The mean response times by sentence and response are summarised in Figure 3. We built a linear mixed model with slopes and intercepts for participant as random factor, and sentence type as predictor; errors (*n*=59) were excluded. The model revealed a significant effect of sentence (*Imperative* vs. *Can* vs. *Possible* vs. *Interrogative*; $\chi^2(3)=52.54$, p <0.001), as well as an interaction between the sentence and the response (*Move* vs. *Yes-No*; $\chi^2(2)=51.92$, p <0.001). Post-hoc analyses revealed no difference in reaction times between imperatives (β= 2833, 95% CI = [2534; 3133]) and the directive

interpretations (move responses) of *Can you* (β = 3014, 95% CI = [2400; 3628]) and *Is it possible* sentences (β= 2863, 95% CI = [2255; 3472]; all p's >0.99). Relative to control interrogatives for which the correct response was *yes* (β=3706, 95% CI = [3235; 4178], reaction times were longer for the question interpretation (*yes-no* responses) of *Can you* sentences (β = 4719, 95% CI = [4187; 5250]; *t*(52.18)= 3.89, p= 0.006) and of *Is it possible* sentences (β = 4410, 95% CI = [3946, 4874]; *t*(48.74) = 3.31; p = 0.03). However, there was no difference between the question interpretations of *Can you* and *Is it possible* sentences (p=0.91).

Figure 3 : Responses per sentence and response type. Vertical bars represent standard error. Only those *Can you*, *Is it possible* and interrogative sentences for which the *yes* response is correct are included.

Third, we measured the total fixation duration on the area of interest (AOI) encompassing the *yes* and *no* buttons and the small area in-between. Like for the response times measures, the segments started when the first coloured shape was spoken out in the sentence and ended as soon as the first left mouse click occurred (either to select a shape or to click on the *yes/no* buttons). Longer fixations on the buttons were interpreted as related to the illocutionary force of questioning. As can be seen from Figure 3, control imperatives, and directive interpretations of both *Can you* and *Is it possible* sentences were associated with almost no fixation in AOI yes-no. Additionally linear mixed model, with slopes and intercepts for participant as random factor revealed no difference between control interrogatives, and interrogative interpretation of *Can you* and *Is it possible* sentences ($\chi^2(2)=1.73$, p = 0.43).

Insert Figure 4 about here

Figure 4: Mean fixation duration on the *yes-no* buttons per sentence and response type. Vertical bars represent standard error. Only those *Can you*, *Is it possible* and interrogative sentences for which the *yes* response is correct are included.

2.4 Discussion

To begin with, conventionalised *Can you* sentences triggered more directive interpretations than the otherwise similar *Is it possible* sentences. Recall that in the context of the task, nothing forced this directive interpretation, which is reflected by the fact that even *Can you* sentences elicited many non-directive interpretations. More importantly, the results of Study 1 strongly confirm the predictions made by non-literalist theorises of illocutionary force attribution. Judging from response times, directive interpretations of interrogative sentences did not seem to be more taxing than that of imperatives, and that independently of the conventionalisation parameter. In other words, assigning directive force to a non-imperative sentence does not seem to require additional processing effort, even if this sentence does not instantiate a construction conventionally associated with requests. In fact,

conventionalised indirect request may even introduce some structural ambiguity: interpreting *Can you* and *Is it possible* as a question when a directive interpretation is available is more taxing, as evidence by higher reaction times relative to control interrogatives. Third, fixation measures confirmed that in such cases, requests are indirect but primary. Fixation to the *yes-no* area is clearly linked to the interpretation of the sentence as a question, and no so such fixation was evidenced for imperatives and for the directive interpretations of *Can you* and *Is it possible* alike.

3 Study 2: imperatives vs. modals

As evoked in the Introduction, non-literalist theories explain the close association between directive speech acts and imperative sentences by the semantic structure of the former. Accordingly, directive force should also be the privileged interpretation of a non-imperative structure whose semantics shares with imperatives those features that render their directive interpretation salient. More particularly, we saw that several non-literalist theories predict that deontic modal sentences, such as (5), should be as direct a request as the corresponding imperative.

We thus expect that *You must VP* sentences, such as (23), should receive a directive interpretation to the same extent and in the same way as the corresponding imperative, e.g. (24). In that they should differ from declaratives with *can/may* (25) or *it is possible* (26) which can be interpreted both as a statement — just as a control declarative, e.g. (27) — and, perhaps less straightforwardly, as indirect requests.

(23) Vous devez mettre le cercle rouge à gauche du rectangle jaune.
'You must put the red circle to the left of the yellow rectangle.'

(24) Mettez le cercle rouge à gauche du rectangle jaune.
'Move the red circle to the left of the yellow rectangle.'

(25) Vous pouvez mettre le cercle rouge à gauche du rectangle jaune.
'You can/may move the red circle to the left of the yellow rectangle.'

(26) Il est possible de mettre le cercle rouge à gauche du rectangle jaune.
'It is possible to move the red circle to the left of the yellow rectangle.'

(27) Le cercle rouge est à gauche du rectangle bleu.
'The red circle is on the left of the blue rectangle.'

The hallmark of statements is being amenable to truth-valuation. The task we used to test our hypothesis is thus identical to that in Study 1, except that this time the alternative to moving a shape was to click on a *true* or *a false* button.

3.1 Materials

We created 24 French test sentences: 3 *You must*, 3 control imperatives, and 6 *You can/may*, 6 *It is possible* and 6 control declaratives. Like in Experiment 1, the audio presentation of each sentence was associated with a grid consisting in a different arrangement

of 8 colored geometrical shapes, accompanied, on the lower part of the screen, by two buttons *TRUE* and *FALSE*. As in Study 2, it is important not to bias the context towards a directive interpretation. For this reason, for all types of items, except the imperative and the *You must* sentences, there was an equal number of trials that could be responded to by *true* and by *false*. For the imperative and *You must* sentences, it was always possible to move the shape as indicated in the sentence. 5 lists were created, in which the order of the 24 trials was randomized; the participants were randomly assigned to a list.

3.2 Participants and procedure

40 students at the Université libre de Bruxelles, native French speakers, participated in the experiment in exchange for a payment of 5 € (28 female, mean age = 21.4 years, standard deviation = 2.7 years, range = 17-28 years). 4 of them were left-handed, but all of them were used to handle the computer mouse with their right hand and they did so during the experiment. All participants had normal hearing, normal or corrected-to-normal vision and none of them had language disorders. None of them had graduated in linguistics or had previous experience with this experimental design. A signed informed consent was obtained for each participant.

The procedure was identical to that of Study 1, with the exception that the *yes/no* button was replaced by a *true/false* button. A short training consisted in 4 combinations of a spoken sentence and a grid, involving 2 explicit performatives, such as (28), and 2 declaratives, such as (29). The correct response to one of the training declaratives, was *true* and *false* for the other one.

(28) Nous vous demandons de mettre le cercle rouge à gauche du rectangle jaune.

'We are asking you to move the red circle to the left of the yellow rectangle.'

(29) Il y a un cercle rouge dans cette grille.

'There is a red circle in this grid.'

Because there was only one possible interpretation for each training sentence, the participants' responses could not be biased either towards the direct statement or towards the indirect directive interpretation of the utterances used later on in the experiment.

3.3 Results

As can be seen from Figure 5, *You must* sentences elicited almost only directive interpretations, viz. move responses. By contrast, in those *You can* and *It is possible* sentence for which this response was possible (hence for the assertive meaning of which *true* was the correct answer), interpretation as statements was dominant. A linear mixed model with participant intercept as random factor revealed an effect of sentence ($\chi^2(2) = 216.91$, $p<.0001$). As expected, *You must* sentences prompted significantly less *true-false* responses ($\beta= -3.33$, 95% CI [-4.32; -2.34] than *You you* ($\beta = 1.19$, 95% CI [0.49; 1.89; z=-8.11, $p<.0001$)

and *It is possible* sentences (β = 2.52, 95% CI [1.66; 3.38]; *z*=-8.994, p<.0001). Additionally, *You can* sentences prompted less *true-false* responses than *It is possible* ones (*z*=-3.29, p = .0028). Response patterns thus confirm that *You must* sentences receive almost an exclusively directive interpretation. In the subsequent analyses, which focus on processing correlates, we exclude the *true/false* responses to *You must* (*n*=21), along with *true/false* responses to imperatives (*n*=9) and other errors (*n* = 18)

Insert Figure 5 about here

Figure 5: Responses per sentence type. Only those *You can* and *It is possible* sentences for which the move response is possible are included. Vertical bars represent standard error.

Next, we compared reaction times between imperatives, declaratives, *You must* and those *It is possible* and *You can* sentences for which a move response was possible (see Figure 6). As in Study 1, response times were computed from the length of time comprised between the moment when the first coloured shape was spoken out in the sentence.

Insert Figure 6 about here

Figure 6: Response times per sentence type and response. Vertical bars represent standard error. Only those *You can*, *It is possible* and declarative sentences for which the *true* response is correct are included.

A linear mixed model with participant slopes and intercepts as random factors revealed significant effect of sentence ($\chi^2(4)= 44.41$, p<.0001), as well as an interaction of Sentence and response ($\chi^2(2)= 30.48$, p<.0001). Response times for *You must* sentences (β = 3122, 95% [2759; 3484]) did not differ from imperatives (β = 2956, 95% CI [2615; 3297], p > .99), and from move responses to *You can* (β = 3146, 95% CI [2590; 3701], p = 1) and *It is possible* sentences (β = 3495, 95% CI [2725; 4264], p = .092). In addition, there was no difference between move responses to *You can* and *It is possible* and between imperatives (all ps >.09). As for *true-false* responses, the only marginally significant difference was that between *true-false* responses to *You can* sentences (β = 4648, 95% CI [4222; 5074]) and control declaratives for which the response was *yes* [β = 3892, 95% CI [3474; 4312], t(50.87)=3.7, p=.0195; all other ps > 0.3).

Insert Figure 7 about here

Figure 7: Mean fixation duration on the *true-false* buttons per sentence and response type. Vertical bars represent standard error. Only those *You can*, *It is possible* and declarative sentences for which the *true* response is correct are included.

Finally, Figure 7 displays the total fixation duration on the *true-false* buttons. Virtually no such fixation was evidenced for imperatives, *You must* sentences and directive interpretations of *You can* and *It is possible* sentences.

3.4 Discussion

Results of Study 2 further support non-literalist models of illocutionary force attribution. First, conforming to the predictions, deontic *You must* sentences are assigned directive force to virtually the same extent and in the same primary way as imperatives. Second, *You can* and *It is possible* declaratives are sometimes interpreted as a requests, even though the context does not mandate this directive interpretation. As in Study 1, such interpretations do not entail longer processing or fixations on the *true-false* area, which would be indicative of the activation of the assertive force. That is, we confirmed that a request can be indirect but primary. Finally, *You can* declaratives trigger more directive readings that *It is possible* ones. One of the most salient reading of the French *pouvoir* (can) is that of a permission. Even though the status of permission relative to other directive speech act is somehow special (e.g. Jary & Kissine, 2014, pp. 64-65), it is understandable that granting permission may sometimes be interpreted as a reason to act. Interestingly, the non-directive interpretation of *You can* sentence seems slightly costlier than that of control declaratives, suggesting a possible interference of the directive force.

4 General discussion

A widely held view in contemporary semantics and philosophy of language is that sentence structure encodes an illocutionary force component. According to this "literalist" view, the three major English sentence-types, such as the imperative, are associated at the semantic level with an illocutionary force, such as a directive. What the processing models based on these literalist theories have in common is the prediction that the interpretation of any utterance of an interrogative or declarative sentence should activate the illocutionary force of questioning or asserting, respectively. To date, however, there has been little discussion of empirical evidence relevant to the validity of literalism.

The two studies reported in this paper strongly support non-literalist models, according to which illocutionary forces are not encoded within the semantics of sentence types. We showed that conventionalization was not required for an interrogative sentence to be interpreted as a request, without the question meaning being activated. That is, we confirmed that both conventional (*Can you_?*) and non-conventional (*Is it possible_?*) are not be secondary, as directive interpretations of interrogatives *Can you_?* and *Is it possible_?* — or, for that matter, of declaratives *You can_* and *It is possible_* — do not elicit longer reaction times than corresponding imperatives. In addition, indirect directive interpretations are not associated with fixations on *Yes/ No* (Study 1) or *True/False* (Study 2) buttons that would have constituted evidence of the activation of a non-directive force.

Importantly, this effect cannot be assigned to a contextual bias, as our experiments were structured in a way that did not favor directive interpretations. In that respect, our experimental paradigms constitutes a major improvement over previous experimental studies that draw a binary distinction is drawn between the contexts that prime the indirect vs. their direct illocutionary force (REFs). This design thus allows insights into the processing correlates of illocutionary force attribution to different sentence types while keeping contextual factors constant.

Our results thus show that indirect interpretations of interrogative and declarative sentences do not require the activation of the questioning or assertive force. As such, they provide support that to theories that conceive of the relationship between sentence types and the speech acts they are prototypically associated of in terms of arrays of semantic features that make the former particularly suited for the latter. While our paper does not directly address the issue of the semantic features that required for making directive force salient, we do provide one empirical indication in that direction. In our Study 2, we confirmed that directive illocutionary force is the prototypically associated not only with imperatives, but also with second person deontic modals. Directive interpretations of deontic modal sentences of the form *You must_* appear to be as natural as for the corresponding imperatives, and entirely similar in terms of reaction times. This is not to say, of course, that deontic modals are entirely closed to an assertoric reading. In the following examples, from Jary and Kissine (PAGES), the privileged interpretation seems to be one of an assertion about the addressee deontic obligation.

(30) A: Jesus can save you...but you must believe it! All you have to do is accept him as your saviour and learn from his teachings...only that way will you be saved in the coming end...you must listen!..

B: Oh no I must not. Stop pushing rubbish down other people's reading space.

http://www.politicalforum.com/religion/219052-jesus-can-save-you-but-you-must-believe.html

To be sure, in the design of our Study 2, this kind of assertive interpretation was more difficult to come by. The point, however, is neither that non-directive interpretation of deontic modals is impossible nor that their semantics is indistinguishable from that of modals. What our results do indicate is that imperatives and deontic modals have a sufficiently similar semantic structure to make their directive interpretation equally natural. In other words, directive force can be directly associated with non-imperative sentence forms.

Finally, results associated with conventional indirect requests provide further evidence for a non-literalist conception of illocutionary forces. Both corpus-based validation of the test items of Study 1 and behavioural results confirmed that construction such as *Can you _?* are clearly conventionalised for the performance of directive speech acts. Recall that it is customary to see think of *Can you _?* constructions as meaning-form pair, conventionally associated with the directive force (Stefanowitsch, 2003). At a first glance, this position seems supported by the fact that the reaction time of directive interpretations of *Can you_?* sentences were indistinguishable from those elicited by the imperatives, as well as the

absence of fixations towards the *yes-now* area, associated with the activation of the compositional, question meaning. However, in a context that did not prime the directive interpretation, *Can you VP?* sentences gave rise to more question than directive interpretation, which may be somehow problematic for such a position. In addition, directive interpretations non-conventionalized constructions *Is it possible to_*? or *It is possible to_* were behaviorally identical to those of the conventionalized *Can you _?* sentences.

In fact, non-directive, question interpretations of *Can you_?* appeared costlier, as they were associated with longer reaction times than control interrogative, for which no directive interpretation was possible. Terkourafi and Villavicencio (2003) argue that conventionalized indirect requests are by-default associated the default directive illocutionary force. Recall, however, that non-directive interpretations of *It is possible_?* also elicited longer reaction times relative to control interrogatives, and that the same holds for non-directive interpretations of *You can_* and *It is possible_* relative to control declaratives. Therefore, if non-directive interpretations is, in fact, more accessible — despite a neutral context —, it source should not be sought within patterns of conventionalization of particular constructions — of 'meaning-form' pairs, but rather at the level of conventions of means. **ELABORATE HERE**.

If so, directive force is perhaps associated, by default, to a certain types of contents. This, however, is very different from including it within the semantics of a sentence type.

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